REMARKS

Claims 1-23 are pending in the current application. Applicants have amended claims 1, 2, 3, 7, 10, 11, 13, and 17. Reexamination and consideration of all pending claims, as amended, are respectfully requested.

Claim 13

Applicants have amended claim 13 to correct a typographical error and not for reasons related to patentability.

§ 112

The Office Action rejected claims 1-10 based on use of the terms "at least one diffraction grating," "each diffraction grating," and "a second diffraction grating." Applicants have amended claims 1-3, 7, and 10 to claim the novel diffraction grating arrangement of the present design.

Applicants thus contend that claim 1 and claims dependent thereon are sufficiently clear and definite, and all claims as amended fully conform to § 112.

§ 103

The Office Action rejected claims 1-7, 10-13, 16-18, 22, and 23 under 35 U.S.C. § 103(a) based on Muller, U.S. Patent 6,271,925, ("Muller")[1] in view of Elssner et al, DD 261422 ("Elssner"), and the remaining claims based on Muller and Elssner in view of other references.

Applicants have amended independent claims 1, 11, and 17. Applicants continue to contend that elements of the claims, in particular as amended, are not shown in either Muller or Elssner, and the combination of the two references is improper and would not result in the inventive aspects claimed herein.

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[1] To the extent it has not been previously brought to the Examiner's attention, Dieter "Muller," inventor of the '925 patent, is the same person as inventor Dieter *Mueller* of the current application.

First, Applicants note that the semiconductor industry has implemented a standard, SEMI-M1, defining wafer thickness variation parameters solely based on metrology techniques measuring wafer front and backsides to determine wafer thickness variations. Such a measurement requires precise measurement to accurately determine thickness variations.

Applicants here specifically focus on two particular distinctions between the combination of Elssner and Muller and the present independent claims, as amended: (1) use of a variable/relatively low coherence light source, and (2) the dual channel precision thickness inspection of the specimen. Applicants further contend that combination of Elssner and Muller in the manner suggested is still improper.

With respect to variable/low coherence, neither Elssner nor Muller discuss use of a variable or relatively low coherence light source. As reflected in the title of the present application, reduced coherence from the long or relatively high spatial coherence sources used in previous devices is a distinct advantage of the present design. As noted at, for example, pages 4-5 of the present application, previous designs have employed collimated laser light sources, typically having excessive coherence lengths. The present design reduces the need for expensive collimated laser sources or sources having excessive coherence lengths.

The light source in Muller is a collimated light source. Elssner apparently does not discuss light source L, but it is apparently neither a reduced coherence nor variable coherence light energy source. Applicants submit that a variable or reduced coherence light energy source is not contemplated nor supported by the references cited, is not suggested therein, and thus such light energy sources render the present claims not obvious over the references of record.

Additionally, as previously noted, the Office Action makes much of employing the reflective surface of Elssner in a Muller type design. Applicants contend that a simply employing the reflective surface of Elssner in a Muller type inspection device, particularly with a variable coherence or low coherence light source, would not operate properly, and would not function in the manner claimed.

Applicants appreciate the statement in the Office Action that the only elements of Elssner selected are the reflective surfaces, and that the combination of the Elssner reflective surfaces into the Muller design are used to reject the present claims. However, Applicants submit that one of ordinary skill would look to the entire Elssner design and its operation, and would not think to combine the references in the manner suggested because of the shortcomings and deficiencies in the Elssner reference.

For example, the Elssner hologram does not produce diffracted orders enabling simultaneous illumination of front and back using a single hologram. Using two of the described Elssner interferometers for front and backside measurement, a second grating (B1) would be necessary to illuminate the two sides. A second grating would require a second optical system to prepare the wave front illuminating this second grating. As a result, such a system would employ two independent illumination wave fronts with individual deformation characteristics (aberrations, collimation errors, and so forth) to separately measure front and backside. Summation of both front and backside wave front deformations will distort the signal, thereby causing significant accuracy deviations. Calibration of the two devices, such as by using a flat reference mirror, will not improve accuracy to the required level. Since the shape of individual wafers deviates significantly from a flat surface, use of a flat surface causes wafer specific wave front distortions in the reflected beam leading to wafer specific shearing effects between the sample beam and the reference beam in the plane of the second hologram, where the beams are recombined. If the illuminating wave fronts are not flat or close to flat with common wave front shapes, the shearing will produce a wave front error superimposed to the actual wave front distortion by the reflection on the wafer surface. This measurement error would occur on front and backside and would disable the accurate measurement of thickness variation, a feature required in all independent claims.

Use of two separate wavefronts for illumination adversely impacts measurement stability. Further, thermal and mechanical drift of two separate illumination wavefronts relative to each other degrades measurement stability. It is therefore desirable to have only one channel with one grating to eliminate drift issues, and to ensure that front and back wavefronts originate from the same initial wavefront and are essentially identical.

The advantage of the present design is the ability to collect phase shifted data from front and back at exactly the same moment with exactly identical phase changes between the channels of data. Collection of data in this manner is essential to obtain the required measurement accuracy and stability. Any time offset between front and backside data acquisition leads to accuracy problems. Besides wafer movement, the calibration of the phase shift has impact on the accuracy of the inspection/thickness measurement.

Further, any slight shifting of the reference flats in a dual-Elssner type arrangement would result in unmatched phase information. Elssner uses reference flat S1 for phase shifting, and as previously noted, Elssner S1 is parallel to the hologram. Any attempt to use two Elssner interferometers for front/back side measurement mandates that phase shifting will not be identical for front and backside – the shifting of two independent reference flats, where two flats are needed to address front and backside of the wafer or specimen. Such an arrangement lacks the ability to perform synchronization, and the identical phase angle calibration for front and backside illumination. This leads to measurement errors induced by unmatched phase information (front does not match backside phase angle change between shifts). One could move the specimen to achieve identical phase shift on front and back, but Elssner's phase shifting device TR would block the illumination on at least one side of the wafer, and such movement would not work in all instances and require excessive experimentation to .

Elssner's second hologram H2 cannot receive simultaneous front and back wave fronts due to the fact that the hologram is parallel to the specimen and reference. For front/backside inspection, an additional H1 and H2 ares required. Independent holograms cannot provide the mechanical (thermal) stability in their alignment to each other, and can thus cause measurement errors. In Elssner one could not determine critical thickness factors, such as actual tilt (wedge) between front and backside. Required absolute thickness measurement is not possible using a single Elssner design nor a dual Elssner arrangement.

Also, it is known that proper imaging of objects requires anamorphic imaging systems if the light from the object is received through anamorphic diffraction elements. Otherwise it is not possible to image the object in one image plane. The Elssner hologram addresses diffraction

of parallel wave fronts (parallel illumination of object). However, the imaging system needs to focus on the object (divergent beam). The Elssner hologram will distort the image, and the object will be partially defocused due to the unusual Elssner arrangement. Assuming a double sided measurement with Elssner, a front versus back measurement would lack coordinate matching due to differently distorted images of front and back. The distorted fringe information will also lead to grossly incorrect phase information (incorrect topography and thickness measurement).

In summary, even if a dual channel Elssner design could be constructed, it would not operate adequately, particularly in the presence of variable or low coherence light energy as currently claimed. Thus Use of Elssner or the Elssner components would not be possible in the Mueller design without extensive experimentation and a complete redesign of the Elssner arrangement.

Combining References

Regarding combining Elssner with Muller, Applicants again state simply that the dual channel/dual reflective surface/dual sided inspection design is entirely missing from Elssner. Reflective surfaces are altogether absent from Muller. Neither Muller nor Elssner disclose nor suggest a plurality of reflective surfaces for inspecting both sides of a dual sided specimen in the presence of a low coherence or variable coherence light source as presently claimed. It is only by resorting to the teachings of Applicants that such a combination is possible.

As previously stated, it is difficult, if not impossible, to see how the Elssner reference surfaces, (particularly in combination with its other teachings) could be used to scan both sides of a two sided specimen in a Mueller type device according to the language of the claims. Elssner indicates scanning of one side of a specimen P using two holograms and an illuminator. To the extent that both sides of the surface P could somehow be scanned using the teachings of Elssner, such a device would likely require multiple illuminators and/or multiple sets of holograms, would not perform adequately nor produce usable thickness measurement data, and thus could not conform to the claim language. In short, it is impossible to see how the Elssner

reference surfaces could be employed in the Muller teaching to perform a scan of both sides of a dual sided specimen, without resorting to the teachings of Applicants.

Applicants again contend that there appears to be no motivation to combine the Muller interferometer with the Elssner reference surfaces. Muller neither discloses nor suggests a plurality of reflective surfaces as claimed. Elssner does not disclose or suggest inspecting both sides of a dual sided specimen, collimating light into two separate channels, or receiving light energy transmitted from each channel and passing nonzero order light energy toward the specimen as presently claimed.

On combining Muller with Elssner, the Office Action states, as a basis for combining the references, that "one of ordinary skill would have been motivated...in order to obtain better surface measurements." Office Action, p. 4. First, this statement does not evidence a motivation to combine, but rather a desired result (better surface measurements) so broad as to be inapposite and overreaching as a motivation to combine. Applicants would contend that everyone of ordinary skill in the art is motivated to obtain better surface measurements every day they come to work. That is not the test of the motivation to combine for an obviousness analysis. Rather, a specific motivation for combining Elssner with Muller must be articulated – why would someone of ordinary skill combine Elssner with Muller without knowledge of Applicants' claimed invention? *See, e.g., In re Kotzab*, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000) ("particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed"); *In re Rouffet*, 149 F.3d 1350, 1359, 47 USPQ2d 1453, 1459 (Fed. Cir. 1998) ("even when the level of skill in the art is high, the Board must identify specifically the principle, known to one of ordinary skill, that suggests the claimed combination. In other words, the Board must explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious.")

The alleged motivation to combine Elssner with Muller in that "one of ordinary skill would have been motivated...in order to obtain better surface measurements" is overly broad

and conclusory. "Whether the Board relies on an express or an implicit showing, it must provide particular findings related thereto. *Broad conclusory statements standing alone are not 'evidence.'"* *In re Kotzab,* 217 F.3d at 1371 (emphasis added), *citing In re Dembiczak*, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999). Also, recitation of the teachings of Applicant are not adequate evidence.

Applicants submit that persons of ordinary skill would not have been motivated to combine these references based on the references themselves, without resorting to the teachings of Applicants. Further, the Office Action presents no appropriate basis or findings for such a motivation to combine the Muller and Elssner references.

Despite the allegation in the Office Action, it remains unclear from the actual references, or other relevant tangible evidence, how or why one would combine the references to form the design currently claimed by Applicants as alleged by the Office Action. Aspects of the Muller design, such as inspection of both sides of the specimen, could not readily be employed in Elssner. Further, it is doubtful that the recited aspects of Elssner could operate in the Muller design, and in particular operate with the Muller design in the presence of a low coherence or variable coherence light source to determine thickness variations of a specimen.

Applicants respectfully submit that the Examiner has used hindsight in rejecting the claims herein. It is only through hindsight, after seeing Applicants' disclosure, that it would be considered possible to create the hearing aid design as claimed by the Applicants.

With regard to the use of hindsight, or the use of an Applicant's teaching to combine references, the courts have overwhelmingly condemned such combinations and have upheld the validity of patents or claims of patents in which such hindsight was employed to combine the references. *W.L. Gore* Associates, *Inc. v. Garlock, Inc.*, 220 U.S.P.Q. 303, 313 (Fed. Cir. 1983), (condemning the "insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher"); *In re Fine*, 837 F.2d 1044, 1051 (Fed. Cir. 1988) ("One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.") Applicant respectfully submits that combination of aspects of the Muller reference with the Elssner design is merely a hindsight reconstruction of

the invention using Applicants' disclosure and claims as a guide. Such hindsight reconstruction of the claimed system is inappropriate

Based on the foregoing, Applicants respectfully submit that claims 1, 11, and 17, as amended, are allowable over the references of record, and that all claims dependent from these independent claims are allowable as they depend from an allowable base claim.

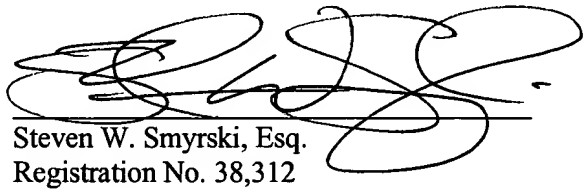
Accordingly, it is respectfully submitted that all claims fully comply with 35 U.S.C. §103.

CONCLUSION

In view of the foregoing, it is respectfully submitted that all claims of the present application are in condition for allowance. Reexamination and reconsideration of all of the claims, as amended, are respectfully requested and allowance of all the claims at an early date is solicited.

Applicants believe that no fees are due in accordance with this Response beyond those included herewith. Should any fees be due, the Commissioner is hereby authorized to charge any deficiencies or credit any overpayment to Deposit Account 502026.

Respectfully submitted,



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